Whey protein gelation: the effect of tryptic hydrolysis

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Abstract

The ability of whey proteins (WP) to form heat induced gels and provide texture is desirable for some "solid like" foods like processed meat, dairy and bakery products. However, this property limits the application of whey proteins in "liquid like" foods including beverages, baby formula and salad dressings [1]. Enzymatic hydrolysis impairs the gelation ability and improves the thermal stability of WP and can be used to expand the applications of WP [2].

From a dietary point of view, the use of whey protein hydrolysates instead of the "whole" protein isolates is interesting to reduce allergenicity or improve digestibility. Whey protein hydrolysates are also an important source of bioactive peptides liberated, from native proteins, during the hydrolysis. Once liberated, peptides may act as regulatory compounds with hormone-like activity [3].

In this work, our main objective is to model the gelling properties of whey protein tryptic hydrolysates (WPTH) as a function of the degree of hydrolysis and the protein concentration. An experimental design was applied where protein concentration range between 10 and 17 % (w/w) and hydrolysis degree range between 0,9 and 4,2 %, according to pH-stat methodology. The rheological behaviour of WPTH during heat gelling under small deformation oscillatory shear was investigated using a controlled stress rheometer AR2000 (TA Instruments). Empirical quadratic models were extracted from the experimental results. The statistical results show a dramatic effect of enzymatic hydrolysis on the gelling behaviour and on the gel properties. This study suggests that enzymatic hydrolysates can be designed for specific food formulations according to the desired gel (meat, dairy or bakery products) or liquid character (beverages, salad dressings).

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